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POLLUTION OF THE NAVIGABLE WATERS OF MORICHES BAY AND EASTERN SECTION OF GREAT SOUTH BAY

Federal Water Pollution Control Administration
Metuchen, New Jersey

September 1966

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REPORT ON

POLLUTION OF THE NAVIGABLE WATERS

OF

MORICHES BAY

AND

EASTERN SECTION OF GREAT SOUTH BAY

LONG ISLAND, NEW YORK

U. S. DEPARTMENT OF THE INTERIOR

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

HUDSON-CHAMPLAIN AND METROPOLITAN COASTAL
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

METUCHEN, NEW JERSEY

SEPTEMBER, 1966

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ERRATA SHEET

for

"REPORT ON POLLUTION OF THE NAVIGABLE WATERS OF MORICHES BAY AND EASTERN SECTION OF GREAT SOUTH BAY"

Page 14: Table V- Figure under heading "Total Coliform per day" should read 7.1×10^{11} instead of 2.5×10^{14}.

"Great South Bay and Moriches Bay, Long Island, N. Y. .....

... Biologists studying this problem conclude that until such a time as the pollution is stopped at its source or the inlets to Moriches and Great South Bay are appreciably widened and stabilized, the shellfish industry and the recreational interests in the area will be at the mercy of unpredictable and uncontrollable meterological conditions."

The President's Science Advisory Committee

November, 1965

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APPENDIX

New York State Conservation Department, Notice to all Shellfish Harvesters, Town of Southampton

New York State Conservation Department, Notice to all Shellfish Harvesters, Town of Brookhaven

New York State Department of Health, Order of Modification

CONCLUSIONS AND RECOMMENDATIONS

1. The navigable waters of Moriches Bay and the easterly end of Great South Bay receive the discharge of wastes from extensive duck farms, municipal and domestic sewerage systems, industrial operations, recreational boats, and land drainage. As a result, these waters are polluted by bacteria, suspended solids, and nutrients.

2. As a result of the bacterial contamination of the overlying waters, substantial areas in Moriches and Great South Bays have been closed by State authorities to the harvesting of shellfish. These closures have resulted in substantial economic injury with the loss of a shellfish crop with a value in excess of $2,500,000 annually.

3. Accordingly, the pollution of these navigable waters is subject to enforcement measures under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended.

4. In addition to constituting a health hazard via shellfish, the bacterial contamination of the waters of the study area constitutes a potential hazard to the health and welfare of persons utilizing these waters for recreation. The pollution of these waters by suspended solids and nutrients has resulted in an unsightly appearance, the production of objectionable odors, and excessive growths of algae and other aquatic plants. These conditions limit the use of these waters for recreational bathing, boating, and esthetic enjoyment.

5. The major sources of bacteria, solids and nutrients to these waters are the extensive duck growing farms lining the shores of a

number of tributary streams. Although these farms do provide settling ponds, the existing treatment facilities do not provide effective removal or control for BOD, nutrients and bacteria and are only partially effective in removing settleable solids. Other known sources of pollution in the area include the discharge of primary treated municipal wastes from one sewage treatment plant, industrial waste discharges, the transport of nutrients and bacteria from individual domestic sewage treatment facilities, and the discharge of bacteria and solids from recreational boats using these waters. Surface and groundwater runoff of agricultural chemicals also serve as additional contributing factors in the pollution of these waters.

6. The pollution of these waters is complicated further by the natural hydrographic conditions. The Bays have extremely limited circulation patterns so that flushing times are extreme. The siltation of Moriches and Fire Island Inlets has been shown to be an important factor in the control of water quality problems in the study area.

7. The waters under consideration have been classified and water quality standards have been adopted by the New York State Department of Health, the agency having legal jurisdiction over water pollution control in the study area. This classification has been conducted through the New York State Water Resources Commission, the state agency charged with such classification.

8. To date abatement orders issued by the State of New York have failed to abate effectively pollution of these waters.

Modification of these orders to incorporate new abatement requirements and time schedules is currently underway.

9. In order to achieve satisfactory water quality it will be necessary for all waste discharges to be abated at the source.

10. Adequate treatment facilities should be constructed to handle the effluent from all duck farms discharging into the study area. Such facilities should meet, as a minimum, the requirements called for in the New York State proposed order of modification, which requires that the facility be capable of providing at least 85% removal of suspended solids and BOD, a substantial removal of phosphates, and effective disinfection to the extent that the final effluent shall at all times contain a chlorine residual of not less than one-half part per million after not less than 15 minutes contact time, and an MPN of coliform organisms not greater than 100 per 100 ml in at least 90% of the samples in a series thereof, provided that at no time may the MPN of such organisms in the final effluent exceed 10,000 per 100 ml. Design and construction of facilities to accomplish the above treatment should be in accordance with the following time schedule included in the New York State Order of Modification:

a. Preliminary plans for treatment to be submitted on or before January 1, 1967;

b. Final construction plans to be submitted on or before August 1, 1967;

c. Construction to be initiated on or before November 1,

1967 and to be completed on or before April 30, 1968;

d. After construction, such facilities shall be maintained and operated in such a condition that they shall meet the requirements listed above.

In addition to the requirements of the Order of Modification, substantial removal of other nutrient materials, particularly the nitrogen group, should also be required.

11. The treatment requirements and time table listed above should also be adopted for all other sources of wastes discharging to these waters with the exception of individual cesspools and septic tanks handling domestic sewage. Current plans for the formation of sewer districts to collect and provide adequate treatment of the wastes now being handled by these individual systems should be implemented as soon as possible, with facilities in operation no later than January 1, 1970.

12. Recent legislation requiring all recreational boats in the area having toilets to provide either adequate treatment facilities or holding tanks capable of storing waste material for subsequent discharge to on-shore treatment facilities should be implemented as soon as possible.

I. DESCRIPTION OF AREA

Geography

The area under consideration for this report lies on the south shore of Long Island, New York. It consists of Moriches Bay, west of Westhampton Beach, and the eastern end of Great South Bay, east of a line connecting Blue Point and Water Island. Included are Patchogue Bay, Bellport Bay and Narrow Bay, the connecting waterway between Great South Bay and Moriches Bay. Also included are the coves, rivers and estuaries tributary to the main bays. Figure 1 shows the study area.

Great South Bay and Moriches Bay are separated from the Atlantic Ocean by a narrow sand bar, in places only a few hundred yards wide. Both bays are extremely shallow, varying in depth from one to 11 feet with a mean depth of four feet. Moriches Bay is nine miles long and varies from one to two miles in width. Great South Bay, in its entirety, is 24 miles long, averages three miles in width, and has an area of 95 square miles. That portion of Great South Bay included in this report is eight miles long and two to four miles wide.

Population and Economy

The study area lies in the towns of Brookhaven and Southampton in Suffolk County. These towns are essentially rural in character and are dotted both inland and along the shore by small incorporated villages and unincorporated areas. The townships have experienced an upsurge in population growth in recent years. In the period 1950-1961,

the population of the town of Brookhaven increased from 44,522 to 114,780, while that of the town of Southampton increased from 17,013 to 28,467 people. During this same decade, the entire Suffolk County experienced a 149 percent increase in population, from 276,129 to 697,462.[1] The population boom in Suffolk County has continued, with estimates of 756,000 by 1963 and 950,000 by the end of 1965[2]. These figures indicate the rapid growth experienced on Long Island as people have moved farther from New York City.

Land use in the study area is mainly residential, recreational and agricultural. There are many summer homes along the ocean and bay shores, and a number of public and private bathing beaches are maintained throughout the area. Smith Point County Park, located on Great South Beach between Great South Bay and Moriches Bay, is part of the long narrow sand bar lying to the south of Great South Bay which constitutes Fire Island National Seashore.

The area is well known for both produce and poultry. Potatoes, cauliflower, asparagus, tomatoes, lima beans and strawberries are the chief crops. The Long Island duck has become a household word throughout the country. These ducks are raised on farms lining the shores of the rivers and inlets along the mainland. In 1965, there were 39 active duck farms in Suffolk County[2]. Thirty-two of these, producing more than three million ducks per year, are located in the study area.

II. HYDROGRAPHY

Although the annual rainfall in Suffolk County averages 43 inches, due to the small size of the watershed there are no major fresh water streams discharging into the bays under consideration.[3] However, there is a large groundwater reservoir under all of Long Island. According to the U. S. Geological Survey, there is a natural discharge from this subsurface reservoir, which occurs through a seaward movement of groundwater and some surface streamflow. As a result of the limited surface runoff, there are only small volumes of fresh water which enter Moriches and Great South Bays. Enough sea water enters through the Fire Island and Moriches Inlets to maintain the salt distribution in the bays but the volumes of new ocean water available for mixing in each tidal cycle are extremely small away from the inlets.[4]

The main circulation in the two Bays appears to result from the progressive nature of the tidal wave, which because of the shallow depths and differing lengths of the two bays causes hydraulic currents in the narrow connecting channels. When both Fire Island and Moriches inlets are open, the water movement is easterly from Great South Bay into Moriches Bay. When Moriches Inlet is closed due to silting, water movement is reversed. One series of measurements, taken in July 1950 when both inlets were open indicated that about 20 million cubic feet of water moves from Great South and Bellport Bays into Moriches Bay during one tidal cycle.[5]

This tidal circulation is so limited that wind induced currents can nullify or even reverse the flow. In November 1951, for example, a persistent wind augmented the flow between the two Bays for four successive

days, and moved the equivalent of two-thirds the volume of Moriches Bay west into Bellport Bay. Undoubtedly, part of this movement was due to the fact that Moriches Inlet was closed so that the normal net tidal flow was westerly.[5]

During the summer, the prevailing winds are light and westerly,[6] inducing circulation patterns which augment the normal tidal circulation. As a result, water from Great South Bay is transferred to Bellport Bay, increasing the hydraulic head on the Smith Point end of the narrows and moving water into Moriches Bay. This same combination of tidal hydraulics and prevailing winds then results in the movement of Moriches Bay water east through the Potunk Point Narrows into Shinnecock Bay.[5]

The maximum water current is eight feet per second through Fire Island Inlet and six feet per second through Moriches Inlet. The total volumes per tidal cycle flowing through these inlets are 2.0 billion and 0.2 billion cubic feet, respectively.[5,7] There is a net flow seaward through Moriches Inlet, which has been measured as about 18 million cubic feet per tidal cycle.[5] In the open Bays, the maximum tidal current is one half a foot per second, and the east-west tidal excursion is of the order of 1.5 miles.[8] The few measurements of net drift that have been made indicate upper values of about one mile per day. Flushing times of four to ten days have been estimated for the western portions of Great South Bay.[4] The mean tidal range is 4.1 feet at Fire Island Inlet and 2.9 feet at Moriches Inlet, and decreases to 0.8 feet at Bellport and 0.5 at Mastic Beach. Maximum reported storm tide (November 1950) at Fire Island Inlet was 9.4 feet above mean sea level.[7]

In general, this tidal circulation is sufficient to prevent stratification in the open Bays, but not near the inlets and rivers. For example, the water is definitely stratified in the upper tidal portion of the Forge River, a factor which sometimes contributes to poor water quality.[9,10]

Water temperatures range from freezing to about 30°C. In summer, the highest temperatures are found in the extensive shallow areas and in the upper portions of the river estuaries.[6,9]

Salinities range from close to zero in the upper portions of the river estuaries to more than 30 parts per thousand in the open portions of the Bays.[6,9]

The weak circulation in these Bays results in a limited amount of available dilution water. This unsatisfactory condition for waste assimilation is worsened by the tendency of winds and currents to confine wastes and waters to the eastern end of Great South Bay, at the farthest possible point from sources of clean dilution water. Hence, due to these circulation problems, the Bays are not suited for the assimilation of large pollution loads.

III. WATER USES

Domestic Water Supply

The primary source of water supply for all purposes in Suffolk County is ground water, generally obtained from individual wells. These same ground waters also provide water for agricultura. irrigation and for operating duck farms. Almost 20 billion gallons of ground water were withdrawn from Suffolk County's underground reservoirs in 1956[11]. This withdrawal is accompanied by a high return rate. The U. S. Geological Survey has estimated that for 1961 in Suffolk County, "probably 80 percent of the water pumped from public, private and industrial wells is returned to the ground."

Bathing

The waters of Moriches and Great South Bays are used extensively for recreational bathing at both public and private beaches. In 1965, the Suffolk County Department of Health issued permits for 108 bathing beaches. There are also many miles of privately owned shore line where the waters are used for bathing. In 1966, a portion of the sand bar separating Great South Bay from the ocean was dedicated as Fire Island National Seashore. With this facility available, it is expected that recreational bathing will increase as an influx of tourists begins to enjoy this site.

Finfishing

The area serves as an important commercial fishing source. In 1961, a total of 354,000 pounds of fish were landed in Great South Bay and Moriches and Shinnecock Bays.[1]

Sport fishing is also very popular in the area. Many deep sea fishing boats operate from the various marinas, and private boats of all sizes are used for fishing.

Shellfishing

Shellfish, primarily hard clams, are harvested extensively from the area. In 1961, more than two million pounds of shellfish were taken from the area[1]. At one time, the area supported an extensive oyster harvest, but in recent years the crop of oysters has been reduced and the oyster is no longer a significant factor in the economy of the area.

Boating

The dramatic increase in recreational boating activities on the national level has been reflected along the entire Long Island shore. As increasing numbers of persons have more leisure and income, there has been an accompanying growth in boating, so that there is now an abundance of all types and sizes of pleasure boats using the waters of Great South Bay and Moriches Bay. Nine yacht clubs and numerous marinas dot the shoreline from Patchogue Bay to Westhampton.

Duck Farming

The operators of duck farms make extensive use of the waters of the rivers, creeks, coves and estuaries, which drain into the bays. These bodies of water and the adjacent shore areas are fenced and diked to form holding pens which provide the ducks with access to both land and water. With traditional methods of duck farming, the majority of the wastes are carried away from the pens by surface water that

is diverted through the runs, or by ground water that is either pumped into the runs or infiltrates into them. Water usage at typical duck farms ranges from 14 to 120 gpd per duck. At the larger farms, water usage can be in the order of 2-3 mgd[12]. In some instances dry farming techniques have been adopted in order to reduce the water requirements.

IV. SOURCES OF WASTES

The waters of the study area serve as a receiving body for the discharge of wastes from extensive duck farms, municipal and domestic sewerage systems, industrial operations, recreational boats, and surface run-off and land drainage.

Duck Farms

There are 34 duck farms, two of which are reportedly out of business, located on waters tributary to Moriches, Bellport and Patchogue Bays. The location of the farms is shown in Figure 1. The owners and the reported annual production are given in Table 1.

Table I

DUCK FARMS TRIBUTARY TO STUDY WATERS[12]

Location No.*	Owner	Yearly Duck Production
Trib. to Bellport Bay:		
1	Gallo Brothers	250,000
2	Leskowicz	200,000
3	Carmen River Farm	200,000
Total to Bellport Bay:		650,000
Trib. to Moriches Bay:		
4	Paul Choenoma	50,000
5	De Piazzy	100,000
6	Jucglielewicz	150,000
7	Swift Stream Duck Farm	100,000
8	Borak Farm	100,000
9	Lukert	150,000
10	Hallock Brookside	120,000
11	Forge River Duck Farm	100,000
12	Harry A. Smith	50,000
13	Walter R. Smith	Out of business
14	Robert H. Smith	60,000
15	Stanley Chornoma	80,000

Table I (Cont'd)

Location No. *	Owner	Yearly Duck Production
16	Chi-Dux Duck Farm	90,000
17	Joseph Podlaski	50,000
18	Vigliotta & Son	60,000
19	Adam Soroka	50,000
20	Adam Kanas	60,000
21	Breezy Acres	6[illegible],000
22	Zygmunt Babinski	50,000
23	Chester Massley	50,000
24	Big Seatuck Duck Farm	90,000
25	Antone Anczurowski	Out of business
26	Peter Kostuk	150,000
27	Tuttle Brothers	80,000
28	Eastport Spec.Duck Waste Dist.	350,000
29	Spring Water Duck Farm	80,000
30	Anna Pacholk	50,000
31	Stephen Kuczma	70,000
32	Leroy Wilcox	50,000
33A) 33B)	C & R Duck Farm	Unknown(Breeders)
Total to Moriches Bay		2,450,000
Total to Bellport & Moriches Bays:		3,100,000

*As shown on Figure 1.

In large scale duck production, holding pens and dikes are built across the stream or other body of water and on the adjacent shore. The ducks move freely between the land and water, depositing waste directly into the stream as well as on the banks. During rainfall, the accumulated organic matter is washed into the stream. Even when the shoreline droppings are raked up, some organic matter is retained by the soil and washed to the water area by rains.[12]

A number of studies have been conducted of the characteristics of the wastes associated with duck farms. The results of several such

studies by the New York State Department of Health are presented in Table II.

Table II

CHARACTERISTICS OF RAW DUCK FARM WASTES[13,14,15]

Characteristic	Ranges Reported lbs/day/1000 ducks
BOD	20.6 - 37
Total Solids	163
Suspended Solids	96
Total Nitrogen	5.7 - 6.2
Kjeldahl Nitrogen	8.2
Total Phosphate	6.8 - 12.4
Soluble Phosphate	2.6 - 6.9

The volume of waste flow from duck farms varies widely. A study by Gates[16] in 1959 reported water use varied from four to 96 gallons per duck. The same study showed coliform concentrations in the effluent ranged from 5.8×10^6 to 58×10^6 MPN per 100 ml. Cosulich[12] found the water use at five selected farms ranged from 14 to 120 gallons per day per duck, and that coliform concentrations were of the same order of magnitude as reported by Gates.

No measurement has been made of the total waste loadings from duck farms. Table III presents estimated loads, based on the data cited above, and on duck production figures shown in Table I. These loads were calculated on the basis of a nine month (March through

Table III

ESTIMATED LOADS FROM DUCK FARM WASTES

Tributary To.	No. Farms	Yearly Production	Ave. Duck Population (1)	Flow MGD (2)	MPN Coliform Per Day (3)
Bellport Bay	3	650,000	116,700	7.0	5×10^{15}
Moriches Bay	29	2,450,000	439,800	26.4	20×10^{15}
Study Area	32	3,100,000	556,500	33.4	25×10^{15}

Loadings in Pounds per Day (4)

Tributary To:	BOD	Total Solids	Susp. Solids	Total N	Kjeldahl N	Total PO_4	Soluble PO_4
Bellport Bay	2,920	18,670	11,670	700	930	1,170	580
Moriches Bay	10,990	70,370	43,980	2,640	3,520	4,390	2,200
Study Area	13,910	89,040	55,650	3,340	4,450	5,560	2,780

(1) Assuming 9 month (39 weeks) season and duck life of 7 weeks.

Average Duck Population = 7/39 x yearly production.

(2) At 60 gal/day/duck.

(3) Assuming waste MPN coliform density of 20×10^6/100 ml.

(4) Based on following waste characteristics in pounds per 1,000 ducks per day:

BOD	25	Kjeldahl Nitrogen	8
Total Solids	160	Total Phosphate	10
Suspended Solids	100	Soluble Phosphate	5
Total Nitrogen	6		

November) duck production season and an average duck life of seven weeks.

Based on the data in Table III, the duck farming industry represents a source of 14,000 lbs per day BOD; 3,300 lbs per day total nitrogen; 5,600 lbs per day total phosphate; and 55,600 lbs per day of the suspended solids in a total waste flow of 33MGD. In addition, these wastes contribute 25 million billion MPN coliform per day to the receiving waters. It is recognized that these loadings are for raw wastes and that some attempts have been made to treat the waste at selected farms. By 1965, all of the duck farms in the area had settling lagoons in operation for removal of duck waste solids. These existing treatment facilities were reported to be only partly effective in removing settleable solids, and are not effective in removing biochemical oxygen demand, nitrogen, phosphates and microorganisms. In addition, there were times when some farms bypassed their treatment facilities.[2,12]

Industrial Wastes

Industrial waste discharges in the area emanate from a poultry processing plant and a fabric finishing mill.

A study[17] of duck-processing wastes was made in 1964 at two plants on Long Island, one of which was reported to discharge its waste through ponds to an area of Moriches Bay. The results of the 1964 study at this plant are presented in Table IV.

Table IV

CHARACTERISTICS OF RAW DUCK PROCESSING WASTES

Waste Flow, gallons per duck	24.3
BOD, lb. per 1000 ducks	43.2
Susp. solids, lb. per 1000 ducks	31.0
Coliform, No. per 100 ml	56,800

During the four days of the study, the plant processed an average of 13,675 ducks per day. Table V presents the estimated raw waste loads from this plant, using this production figure and the data from Table IV.

Table V

ESTIMATED LOADINGS - RAW DUCK PROCESSING WASTES

Flow gal/day	BOD lbs/day	Susp. Solids lbs/day	Total Coliform per day
332,000	590	420	2.5×10^{14}

In 1964, the raw waste from this operation was discharged to a settling pond prior to discharge to Moriches Bay. No data are available on the efficiency of treatment obtained by this settling, or on the quality of final effluent discharged to the bay. However, visual observation of the settling pond and final effluent indicate an unsatisfactory removal of waste material.

No data are available on the wastes from the fabric finishing plant in Patchogue, the Patchogue-Plymouth Mill. During the early 1950's this firm discharged fabric finishes and dyes to Patchogue

Creek. In 1954, the New York State Department of Health initiated abatement action against this firm. By January, 1963 abatement had been achieved according to Health Department records.

Municipal Wastes

The only municipal waste source discharging to the study area waters is that of the Village of Patchogue, which has a sanitary sewer and primary treatment plant operated by the Patchogue Sewer District. In 1951, this plant was reported[18] to provide inadequate treatment for 3,400 persons. By 1954, alterations and improvements were underway and the State of New York indicated the plant would provide adequate treatment on completion of the work.[19] The available data on this plant as of 1966 are presented in Table VI.

Table VI

DATA ON PATCHOGUE SEWER DISTRICT TREATMENT PLANT[20]

Type of System	Population Served	Design Flow-MGD	Treatment	Receiving Water
Separate-Sanitary	5,000	0.5	Screens, grit removal, settling, post-chlorination	Patchogue Creek

Assuming a BOD of raw municipal sewage equal to 0.17 lbs. per capita per day and 30% removal by primary treatment, the discharge from this plant represents a load of 600 lbs. per day of BOD which is only five percent of that attributed to the duck farms.

Cesspools and Septic Tanks

The majority of the residents in the drainage areas of the study waters dispose of domestic sanitary sewage by individual cesspools or

septic tanks. If the soil is porous and has a high ground water level, the wastes from such systems tend to contaminate and become a part of the ground water flow. This contamination of the ground water has been demonstrated by pollution of many wells in the area. In 1963, for example, the Suffolk County Department of Health estimated that 35 percent of the individual wells in Center Moriches were polluted. In areas of non-porous soils, cesspool and septic tank systems frequently overflow and the waste becomes a part of the surface run-off.

The rapid increase in population for the study area and for all of Suffolk County has been described earlier in this report. Table VII presents the 1960 population data for those communities lying within the drainage area under consideration and south of Sunrise Highway. These communities, with the exception of a portion of Patchogue, rely on individual sub-surface disposal means to handle sanitary wastes.

Table VII

MAJOR COMMUNITIES IN DRAINAGE AREA
South of Sunrise Highway

Name	1960 Population[1]	Means of Waste Disposal
Bellport Village	2,461	Individual Sub-surface
Center Moriches	2,521	Individual Sub-surface
East Moriches	1,210	Individual Sub-surface
Mastic Beach	3,035	Individual Sub-surface
Mastic-Shirley	3,397	Individual Sub-surface
Patchogue Village	8,838	(3,838 Ind. Sub-surface (5,000 Patchogue Sewer Dist.
Total 1960 Population	21,462	

Hence, of the 21,000 persons in the immediate area, more than 16,000 attempt to discharge their wastes into the ground. Previous studies of ground water flow in the area of Brookhaven, Suffolk County, have shown a general southwesterly movement of ground water at a rate of approximately 0.3 feet per day[22]. Although the movement of sub-surface water through soil does reduce bacterial contamination and suspended solids, dissolved materials such as nitrogen and phosphate can be transported with no decrease in concentration. Hence, the use of septic tanks and cesspools by the large rural type population provides a mechanism for injection of pollutants into the ground water and subsequent transport via the sub-surface aquifers into the adjoining surface waters. The transport of nutrients such as nitrogen and phosphate in this manner presents a significant source of pollution to the waters of the study area.

Recreational Boating

While no information is available as to the magnitude of problems associated with the use of these particular waters for recreational boating, studies elsewhere have shown that recreational boating represents a significant source of pollution. In areas of high boat density, such as marinas, the discharge of human waste with inadequate or no treatment results in pollution by bacteria and solids.

Other Sources of Pollution

In addition to the sources of pollution described above, water quality may be adversely affected by a variety of other land and water

based activities. As part of the intense agricultural activity associated with truck farms found throughout Suffolk County, large quantities of agricultural chemicals are spread over the surface of the land. As a result of rainfall, excess chemicals are washed into the surface waters or percolate into the ground water aquifers. Hence there is a transport of material, including nutrient fertilizers and toxic herbicides and pesticides, across and through the land into adjacent bodies of water. This source should be recognized as a possible contributing factor to the problems in the waters of the study area.

Additional degradation of water quality can occur as a result of extensive dredging activities. The disturbance of the bottom by dredges can result in a re-suspension of accumulated organic sludges and silt. In addition, uncontrolled dredging can result in the formation of significant potholes in the bottom of the bays. Such potholes can markedly increase detention time and reduce circulation, thereby preventing adequate mixing of pollutants with the receiving water, and subsequent flushing of the system.

V. EFFECTS OF WASTES ON WATER QUALITY AND USES

There have been many water quality studies in Moriches Bay and the eastern portion of Great South Bay. Most of these studies were conducted for relatively limited purposes and hence did not include consideration of all parameters of water quality and all adverse effects of degradation in quality on the various water uses. Hence, it is necessary to draw on a number of reports for an overall evaluation of the extent of pollution and its effects.

The President's Science Advisory Committee has summarized the pollution problem in Great South Bay and Moriches Bay as follows:

"1. Great South Bay and Moriches Bay, Long Island, N. Y.: Agricultural and domestic sewage pollution.--A serious pollution problem which caused the failure of a once prosperous shellfish industry and lessened the recreational use and esthetic value of Great South, Moriches, and Shinnecock bays prompted the towns of Islip and Brookhaven (Suffolk Co., N.Y.) to commission Woods Hole Oceanographic Institution (W.H.O.I.) to conduct an analytical survey toward finding the causative agents and their necessary remedial measures W.H.O.I. has conducted this survey since 1950.

"Using phosphorous concentration as an index of pollution, W.H.O.I. investigators traced the source of pollution to duck farms in Great South and Moriches Bay. Studies of the bay's hydrography showed that the low flushing rates of the bays were responsible for holding the pollutants long enough to permit massive proliferations of minute algae which were deleterious to oysters. Dredging Moriches inlet open served to increase the

flushing rate and consequently pollution was substantially reduced. It did not recur until the inlet silted in sufficiently to lower the flushing rate. Conclusions from this study were that low salinity and low flushing rates augment ill effects of these pollutants (in this case the organic nitrogen compounds from duck-farm waste) and that remedial measures are any that will raise salinity and flush out nitrogenous wastes. These generalizations appear to have held true during the period of the investigation.

"Biologists studying this problem conclude that until such a time as the pollution is stopped at its source or the inlets to Moriches and Great South Bay are appreciably widened and stabilized, the shellfish industry and the recreational interests in the area will be at the mercy of unpredictable and uncontrollable meterological conditions.

"In 1964 residents of Brookhaven and adjacent towns complained again of foul smells emanating from Great South Bay. In spite of a decline in the duck farming industry, pollution was great enough to hamper recreational use of parts of the Bay, and bubbles of H_2S and methane belching from bottom potholes discolored paint of houses near the water. It was then found that dredged areas along the shore served as traps for large multicellular algae which underwent anaerobic degradation, producing the unpleasant gases. Much of the rotting material came from abnormally expanding Zostera beds in shallow areas of the Bay. It appears now that pollution from the duck farm wastes is now being augmented by an increasing human population along the bay shore and that septic tank wastes may have become the major source of algal nutrient. No study of these new developments is in progress as of this date.*******"[23]

Many of the specific conditions described below have been observed in the streams that receive duck farm wastes in the area under consideration, and have led to numerous complaints. The discharge of wastes to these waters has caused economic injury to the shellfish industry, decreased esthetic enjoyment, produced offensive odors, decreased productivity of fish and other aquatic life, and interfered with recreational uses of the waters. On the beaches adjacent to the mouths of some of the streams strips of black, odorous sludge have accumulated on the sand at the water's edge, or may be uncovered by digging into the shallow layers of sand that have been washed over them by wave action.

Bacteria

Bacteria from duck and human feces constitute a major pollution problem in the waters of the area. The major source of bacteria is the duck raising industry, although some bacteria survive the sewage treatment process of the Village of Patchogue, or may reach the bay waters from inadequate private sewage disposal systems of individual homes along the waterfront. Other bacteria are discharged from recreational boats using these waters.

Bacterial pollution has caused the closure of valuable shellfish water in both Moriches Bay and Bellport Bay, as well as in other areas of Great South Bay. Those areas closed to shellfishing are shown in Figure 1. Copies of the closure orders are included in the Appendix. According to the Shellfisheries Management Unit of the State of New York Conservation Department, harvesting of clams is prohibited in 4,540 of the 10,775 acres of Moriches Bay and 1,600 of the 3,840 acres of Bellport

Bay. The combined closed acreage, representing 42% of the total water area, is estimated to be capable of producing more than 300,000 bushels of clams annually, with a value in excess of $2,500,000. This unharvestable crop represents a major economic loss to both the shellfish industry and the area as a whole. Most of the bacterial pollution that necessitates closing of these shellfish waters appears to originate on the many duck farms clustered along the streams of the area from Speonk River on the east to Carmans River on the west, as shown in Figure 1.

An additional 400 acres of shellfish beds in Patchogue Bay are closed to harvesting because of bacterial pollution from the Village of Patchogue sewage treatment plant. Summer homes that may contribute to the bacterial pollution of adjacent waters are located principally along Narrow Bay which connects Moriches and Bellport Bays.

The economic loss in shellfish production is not the only damage caused by bacteria. The streams on which duck farms are situated, including their tidal sections and adjacent waters, are subjected to bacterial pollution that in some areas is a definite hazard to the health of those coming in contact with the waters. In other areas, the bacterial contamination makes the use of the waters for such recreational activities as swimming, boating, and fishing questionable. The detection of particular species of Salmonella bacteria known to cause human gastrointestinal diseases, in the wastes of several duck farms and the receiving waters emphasizes the existence of this hazard to human health.

Nutrients

Human and animal feces contain phosphorus and nitrogen that serve as

nutrients, or fertilizer, for both land and water plant life. Although other elements are necessary as nutrients for plant growth, deficiencies in phosphorus and nitrogen are believed to be the most common limits on aquatic plant growth. Current technology permits the design of treatment plants capable of removing these elements from sewage and industrial waste, although conventional treatment plants provide only slight reduction of these materials.

Both Moriches and Bellport Bays, as well as the entire Great South Bay, are rich in phosphorus and contain adequate nitrogen to support prolific growths of both suspended and attached algae. Whereas open coastal waters commonly contain 0.02 to 0.05 milligrams per liter (mg/l) of phosphorus (as P), the enclosed Moriches and Bellport Bays have been found to contain from 0.02 to more than 1.0 mg/l of phosphorus. While the limiting concentration of phosphorus for excessive algae growth in sea water has not been established, the commonly accepted limiting concentration in fresh water is 0.01 to 0.015 mg/l.

The limiting value of nitrogen for aquatic plant growths in fresh water is generally accepted to be 0.3 mg/l (as N). The waters of the two bays have been found to contain from 0.2 to 0.9 mg/l of total nitrogen. Sources of this phosphorus and nitrogen are the wastes from duck farms, the direct discharge of domestic and municipal sewage, and percolation from private home sewage disposal systems.

With the adequate supply of nitrogen and the abundance of phosphorus, the waters of the bays support luxurious growths of suspended algae, attached filamentous algae and rooted aquatic plants. The suspended

algae have caused both economic and esthetic damage. In 1955 especially, and to a lesser degree in other years, a particular form (Nannochloris atomius) of very minute suspended algae clogged the gills of clams and markedly reduced their quality and production in Moriches Bay, resulting in economic losses. The suspended algae generally reduce esthetic enjoyment of the bay waters by reducing their clarity, sometimes to the extent that objects in more than two feet of water are not visible from the surface.

These algae forms also pose a threat to the dissolved oxygen content of the bay waters. Dissolved oxygen is necessary to support aquatic life, including fish. With unfavorable changes in environmental conditions, the sudden death and subsequent decomposition of the dense algae population can deplete the dissolved oxygen of areas of the bays to the extent that fish and other aquatic life are not able to survive.

The attached filamentous algae and rooted aquatic plants cause another and very obvious type of esthetic damage. They become detached from their moorings, especially during periods of turbulent water, accumulate as slimy masses in the surf and wash up on the shore. It is not uncommon to see masses of these detached plants covering long reaches of the shore several inches deep and many feet from the water's edge. They not only present a most unsightly appearance but also decay and produce extremely offensive odors. With shoreline conditions such as these, the waters have an extremely limited recreational value.

Suspended Solids

Wastes from duck farms contain variable concentrations of suspended solids. In some cases, the concentration of suspended solids may be as

much as one-half of that found in untreated domestic sewage. These suspended solids include large proportions of decomposable organic solids.

Upon discharge to the receiving streams, the suspended solids immediately impart a disagreeable grey turbidity to the waters and diminish their esthetic appeal. The heavier solids settle to the stream bottom in the vicinity of the points of discharge and form objectionable and harmful sludge deposits. These sludge blankets cover and destroy the bottom aquatic animals that serve as food for fish. The organic material in the sludge undergoes a decomposition process which lowers the dissolved oxygen level in the overlying waters, at times to below that needed for fish and other aquatic life to survive. When complete depletion of oxygen occurs, the further decomposition of organic matter produces obnoxious hydrogen sulfide gas which appears as bubbles on the surface. This gas breaks loose masses of the deposited sludge and lifts them to the surface where they appear as unsightly grey to black odorous clumps and rafts.

The lighter suspended solids are carried downstream by the velocity of the flowing water to settle and form similar sludge banks in eddy areas distant from the points of discharge. In coastal streams, the salt content of the sea water precipitates the fine colloidal portions of the suspended solids to form additional sludge deposits where fresh and salt waters meet.

Thus, these suspended solids may produce harmful effects throughout the entire lengths of the receiving streams from the points of discharge to their mouths.

VI. POLLUTION ABATEMENT PROGRAMS

The State of New York, originally through its Water Pollution Control Board and more recently through the New York State Water Resources Commission, conducts a program of classification of state waters. Such a program delineates the best usage for the waters and establishes applicable water quality standards which are to be met so as to make possible such water usage.

In 1951, the State classified the waters of Moriches Bay and its tributary streams. This was followed in 1954 by the adoption of classifications for the waters of Patchogue and Bellport Bays, the adjoining southerly portion of Great South Bay, and the tributaries to these waters. In general, the classifications adopted require water quality suitable for shellfish propagation in the open bays and bathing on the shoreline, with lower classifications for the various tributary streams so as to permit reasonable use for waste disposal.

Following classification, the State issues comprehensive plans for the abatement of pollution and upgrading of the waters to meet the adopted standards of water quality. In February of 1952, a comprehensive plan was issued for the abatement of pollution from the waters of the Moriches Bay drainage basin. This plan included orders for the abatement of pollution resulting from the operation of duck farms and set a timetable requiring completion by April, 1954, but was noted as being flexible and took recognition of the lack of satisfactory methods for the treatment of duck farm wastes.

In January 1954, a comprehensive plan was issued for the abatement of pollution from the waters of the Great South Bay - Easterly Section Drainage Basin, which includes Patchogue and Bellport Bays and their tributaries. This plan established a requirement for the removal of all ducks from open natural waters and the installation and operation of devices for the effective removal of settleable solids. No date for the meeting of such requirements was established by this order.

Based on available information, the requirements of the abatement orders issued in 1952 and in 1954 have yet to be met by the various duck farms.

In early 1966 the New York State Department of Health was considering an order of modification establishing a timetable for the abatement of pollution by duck farm wastes. Under the terms of this order, a copy of which is included in the Appendix, submission of preliminary plans for biological treatment would be required on or before January 1, 1967. Such treatment would be required to provide at least 85% removal of suspended solids and BOD, removal of a substantial portion of the phosphorus, and effective disinfection of the effluent. The order also stipulates that final construction plans for such facilities must be submitted on or before August 1, 1967 and construction must be undertaken on or before November 1, 1967 so as to be complete on or before April 30, 1968. The order would further require maintenance and operation of these treatment facilities so that they shall, at all times, meet the performance criteria described above.

The Suffolk County Department of Health conducts an annual inspection

program of duck farm waste treatment facilities. The Department's Annual Report for 1963 described the poor compliance record obtained through that date. By 1965, however, inspection showed that all of the active duck farms had in operation settling lagoons.

A number of studies have been made to determine feasible means of treatment of the duck farm wastes. In 1957, a Special Waste Disposal District was established in the Town of Southampton to construct a treatment plant to abate pollution from several duck farms. The project was determined to be eligible for financial assistance under the Construction Grants Program of the Federal Water Pollution Control Act and construction of a primary treatment plant was started in June of 1958. In January of 1959, the Public Health Service made a partial payment of $5,000 towards the cost of the plant. The plant was reportedly completed in July of 1961 at a total cost of $29,400 and a request was made for a final payment of $2,350 by the Federal Government. However, an inspection by the Public Health Service immediately after completion of construction indicated a structural failure in the tank. After correcting this failure, the operating agency still failed to complete connections to the plant and to operate the plant in a satisfactory manner. The Federal Government has not yet made its final payment toward the cost of this plant due to continuing lack of adequate operation and maintenance, and a field visit in August 1966 indicated the plant was not in use.

The interest in the abatement of pollution from duck farm wastes is demonstrated by the emphasis placed upon this problem by the New York State Joint Legislative Committee on Natural Resources. The 1959 Report

of this committee noted "Each year for the past seven years the Committee has convened a year-end inventory conference on the Long Island duck wastes pollution problem." The Committee has reviewed this problem and made specific recommendations over a number of years.

In September of 1965 the Suffolk County Department of Health received an interim report on a comprehensive sewerage study for the five western towns of Suffolk County. This report suggested the creation of two sewage districts to collect, treat, and dispose of water-borne waste. The preliminary design encompasses a series of interceptor sewers, a treatment plant providing 90% or better removal of all objectionable constituents, outfalls to conduct plant effluent to the Atlantic Ocean, and facilities for the recharge of the groundwater by treated effluent.

Also in September 1965 the Suffolk County Board of Supervisors authorized the formation of a Suffolk County Sewer Agency charged with carrying out studies leading to the preparation of plans and ultimate construction of sewerage facilities for Suffolk County.

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C O P Y

NEW YORK STATE CONSERVATION DEPARTMENT
SHELLFISH SANITATION AND ENGINEERING SERVICES
OAKDALE, LONG ISLAND, NEW YORK 11769

NOTICE TO ALL SHELLFISH HARVESTERS

The following is a Statement of the Sanitary Condition of the shellfish lands including a listing of those areas which are closed to the taking of shellfish of all kinds for the town in which you claim residency. THE STATE LAW PROHIBITS YOU FROM WORKING IN ANY AREAS THAT ARE CLOSED TO THE TAKING OF SHELLFISH. You may not work in any of these closed areas without first obtaining proper permits from this Department. The Conservation Department holds you responsible for being acquainted with the sanitary condition of any and all areas from which you harvest shellfish.

If you intend to harvest shellfish in waters of any town other than that in which you claim residency, it is mandatory that you contact either the Town Clerk of the town in which you intend to work, or the Shellfish Sanitation and Engineering Services Office of the New York State Conservation Department and obtain a listing of any areas that may be closed to shellfishing in that town.

NOTICE OF CONDITION OF ALL SHELLFISH GROUNDS LOCATED WITHIN OR ADJACENT TO THE TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK.

The shellfish lands within the County of Suffolk, Town of Southampton, except those listed hereafter, are in such sanitary condition that shellfish thereon may be taken for use as food, and such lands are designated (open) areas.

The following shellfish lands within the County of Suffolk, Town of Southampton, are in such sanitary condition that shellfish thereon shall not be taken for use as food, and such lands are designated uncertified (closed) areas.

Town of Southampton

Moriches Bay

1. All of Seatuck Cove and its tributaries north of a line extending easterly from the southernmost tip of Havens Point to the mouth of the canal known locally as Wetzel's Creek, including all of Wetzel's Creek.

Town of Southampton

Moriches Bay (Continued)

2. All rivers, creeks and canals of the mainland shore between Havens Point and the highway bridge at Potunk Point, including all those at Westhampton Beach, except Quantuck Canal.

3. That area of Speonk Cove north and west of a line extending northeasterly from the southernmost tip of Speonk Point to the summer cottage near shore on the property of the Cedar Beach Hotel at the foot of Jagger Lane at Tanner Neck (local landmark).

4. Also that area lying north and east of a line extending northeasterly from the southeasternmost tip of Forge Point to Buoy Fl R"27" in the main channel and thence easterly along the buoyed channel through the bay to the highway bridge at Potunk Point including all of the buoyed channel, from May 1 to October 31, both inclusive.

Quantuck Bay

1. All mainland creeks and canals at Quogue except Quogue Canal.

2. Quantuck Creek north of the Montauk Highway.

Shinnecock Bay

1. All creeks and canals at East Quogue including that area of Weesuck Creek north and east of a line extending due east from the southeasternmost utility pole on Weesuck Avenue to the opposite shore.

2. All of the Shinnecock Canal.

Note: All reference points in the above areas in the Town of Southampton taken from U.S.C. & G.S. Nautical Chart 120-SC edition of 1964, except as indicated as "local landmark."

Mecox Bay

1. Hay Ground Cove north of a line extending due west from the northern shore of Calf Creek at its mouth (local names).

2. Also Hay Ground Cove, Calf Creek and the area within a one-quarter-mile radius of the mouth of Hay Ground Cove, from May 1 to October 31, both inclusive.

Town of Southampton

Mecox Bay (Continued)

Note: All reference points in Mecox Bay in the Town of Southampton taken from U.S.C. & G.S. Chart #1212 dated May 25, 1963, except as indicated as "local names".

Sag Harbor

1. That area of Sag Harbor and its tributaries lying within or west of the breakwater and south and west of a line extending northwesterly from the northern end of the breakwater to the southeastern corner of the 1 last white house at the southern end of East Harbor Drive at North Haven (owned in January 1965 by J. B. Carr) and east of the highway bridge known as the Sag Harbor-North Haven Bridge (local landmarks).

2. That area of Sag Harbor Cove and Upper Sag Harbor Cove lying west of the highway bridge known as the Sag Harbor-North Haven Bridge (local landmark).

Note: All reference points in Sag Harbor in the Town of Southampton taken from U.S.C. & G.S. Chart #363 dated August 31, 1964, except as indicated as "local landmark".

Peconic River

1. All tidal waters of the Peconic River and its tributaries within the Town of Southampton.

Flanders Bay and Reeves Bay

1. That area of Flanders Bay and Reeves Bay lying south and west of a line extending northwesterly from Red Cedar Point to Channel Buoy Fl R"6" and thence northerly to Sims Point at Fanning Beach (local landmarks).

2. All rivers, creeks and canals tributary to Flanders Bay and Reeves Bay.

Note: All reference points in Peconic River, Flanders Bay and Reeves Bay in the Town of Southampton taken from U.S.C. & G.S. Chart #363, dated August 31, 1964, except as indicated as "local landmark".

Town of Southampton

Atlantic Ocean

1. All areas of the Atlantic Ocean in the Town of Southampton are certified (open) for the taking of surf clams only.

R. Stewart Kilborne
Conservation Commissioner

By:

Quentin R. Bennett
Marine Fisheries Sanitarian

Dated: Albany, N.Y.
March 20, 1965

As Amended through
March 15, 1966

C O P Y

NEW YORK STATE CONSERVATION DEPARTMENT
SHELLFISH SANITATION AND ENGINEERING SERVICES
OAKDALE, LONG ISLAND, NEW YORK 11769

NOTICE TO ALL SHELLFISH HARVESTERS

The following is a Statement of the Sanitary Condition of the shellfish lands including a listing of those areas which are closed to the taking of shellfish of all kinds for the town in which you claim residency. THE STATE LAW PROHIBITS YOU FROM WORKING IN ANY AREAS THAT ARE CLOSED TO THE TAKING OF SHELLFISH. You may not work in any of these closed areas without first obtaining proper permits from this Department. The Conservation Department holds you responsible for being acquainted with the sanitary condition of any and all areas from which you harvest shellfish.

If you intend to harvest shellfish in waters of any town other than that in which you claim residency, it is mandatory that you contact either the Town Clerk of the town in which you intend to work, or the Shellfish Sanitation and Engineering Services Office of the New York State Conservation Department and obtain a listing of any areas that may be closed to shellfishing in that town.

NOTICE OF CONDITION OF ALL SHELLFISH GROUNDS LOCATED WITHIN OR ADJACENT TO THE TOWN OF BROOKHAVEN, SUFFOLK COUNTY, NEW YORK.

The shellfish lands within the County of Suffolk, Town of Brookhaven, except those listed hereafter, are in such sanitary condition that shellfish thereon may be taken for use as food, and such lands are designated certified (open) areas.

The following shellfish lands within the County of Suffolk, Town of Brookhaven are in such sanitary condition that shellfish thereon shall not be taken for use as food, and such lands are designated uncertified (closed) areas.

Town of Brookhaven (South Shore)

Great South Bay

1. All of Patchogue Creek, Swan Creek, Mud Creek, Hedges Creek, Howell Creek, and all other creeks and canals between Blue Point and Howell Point.

Town of Brookhaven (South Shore)

Great South Bay (Continued)

2. That area of Patchogue Bay, and all adjacent creeks and canals, lying north and west of a line extending southeasterly from a privately maintained light (Fl G"B") at the end of the bulkhead forming the entrance to the canal and boat basin at Blue Point (Corey Creek) to Buoy N"4" in the channel leading to Patchogue Creek, and continuing northeasterly to a privately maintained light (F-R) at the southeastern tip of the bulkhead forming the Village Dock at the foot of Ocean Avenue in Patchogue, and thence easterly to the southern tip of two sunken wooden barges (local landmark) near the entrance to the first canal and boat basin east of Mud Creek. (When the above lights are not operating the bulkhead extremities on or near which the lights are located will serve as markers for the lines of closure.)

Bellport Bay

1. That area north and east of a line extending easterly from the flagstaff at the Bellport Yacht Club at the dock at the foot of Bellport Lane in Bellport to Black Buoy Fl G"5" in the main channel, and continuing southeasterly along the main channel to Red Buoy Fl R"12" near Smith Point, and thence northeasterly to the tip of Smith Point.

Narrow Bay

1. All that area, including Johns Neck Creek and all creeks and canals of the mainland shore, between a line extending southerly from Smith Point to the flag tower on Great South Beach and a line from shore to shore passing due north and south through Buoy Fl G"17" located in the main channel near Pattersquash Island.

2. All of Pattersquash Creek and the area of the mouth of Pattersquash Creek.

3. The canal known locally as Mastic Beach Lagoon and the area of the mouth of said canal.

Moriches Bay

1. That area north and west of a line extending northeasterly from the mouth of Home Creek (local landmark) to Masury Point, including all of Home Creek, the Forge River and its tributaries, and all other creeks and canals of the mainland shore between Forge Point and Masury Point.

Town of Brookhaven (South Shore)

Moriches Bay (Continued)

2. That area north and west of a line extending northeasterly from Masury Point to the privately maintained light (Fl G) at the mouth of Orchard Neck Creek, including all of Senix Creek, Orchard Neck Creek and all other creeks and canals of the mainland shore between Masury Point and Orchard Neck Creek.

3. That area including the Terrell River lying north and east of a line extending southeasterly from the privately maintained light (F-G) at the mouth of Orchard Neck Creek to Buoy Fl G"31" in the main channel and thence northeasterly to the southernmost tip of Tuthill Point.

4. All of Tuthill Cove north and west of a line extending northeasterly from the southernmost tip of Tuthill Point through Channel Buoy N"4" to the shore at the Moriches Coast Guard Station (Moriches CG No. 76).

5. All of Hart Cove and its tributaries north and west of a line extending northeasterly from shore at the foot of Evergreen Avenue (local landmarks).

6. All of Seatuck Cove and its tributaries north of a line extending easterly from the southernmost tip of Havens Point to the mouth of the canal known locally as Wetzels Creek, including all of Wetzels Creek.

7. Also that area lying north and east of a line extending northeasterly from the southeasternmost tip of Forge Point to Buoy Fl R"27" in the main channel and thence easterly along the buoyed channel through the bay to the highway bridge at Potunk Point including all of the buoyed channel, from May 1 to October 31, both inclusive.

Note: All reference points in the Town of Brookhaven (South Shore) taken from U.S.C. & G.S. Nautical Chart 120-SC edition of 1964, except as indicated as "local landmark".

Town of Brookhaven (North Shore)

Port Jefferson Harbor

1. All that area of Port Jefferson Harbor south and east of a line extending southwesterly from the flashing light and bell on the

Town of Brookhaven (North Shore)

Port Jefferson Harbor (Continued)

jetty at the eastern side of the entrance to Port Jefferson Harbor to the flashing red light on the jetty at the western side of the harbor entrance and then continuing southerly to a stone jetty at the shore near Buoy C"3" at the entrance to Setauket Harbor.

Note: All reference points in the Town of Brookhaven (North Shore) taken from U.S.C. & G.S. Chart #361 dated July 6, 1963.

R. Stewart Kilborne
Conservation Commissioner

By:

Quentin R. Bennett
Marine Fisheries Sanitarian

Dated: Albany, N.Y.
March 20, 1965

As Amended through
March 15, 1966

C O P Y

ORDER OF MODIFICATION

A Notice of a consolidated public hearing and a Complaint in the above entitled proceedings having been duly served and the Respondent, by GREENWALD, KOVNER and GOLDSMITH, his Attorneys, pursuant to Part 76.4 of Chapter II of Title 10 of the Official Compilation of the Codes, Rules and Regulations of the State of New York, having waived such hearing and having stipulated with the Counsel of the New York State Department of Health that all of the allegations of the Complaint contained in paragraphs are true and that facts exist upon which this Order may be predicated and that the same might be made, filed and served,

NOW on reading and filing said Notice of Hearing and Complaint and proof of service thereof and stipulation, and due deliberation having been had, it is

ORDERED:

1. THAT said stipulation be and the same hereby is approved and the facts thereof are found and the conclusions thereof are arrived at.

2. THAT all Orders of the Water Pollution Control Board and of the Commissioner of Health of the State of New York directed to or against the Respondent be and they hereby are modified to provide that the Respondent shall, and said Respondent is hereby ordered and directed to, on and after January 2, 1967, cease and abate, and thereafter keep abated all discharges of duck wastes and duck processing wastes by him or through or from lands or facilities owned by him or under his management or control into the waters of the State unless said Respondent shall:

(a) On or before January 1, 1967, submit to the New York State Department of Health, through the Suffolk County Health Department, preliminary plans showing facilities for biological treatment of all such wastes and/or effluents thereof to the extent that at least 85% of the suspended solids and at least 85% of the biochemical oxygen demand and a substantial portion of the phosphates thereof and therein shall be removed and facilities for disinfecting such wastes and/or waste effluents to the extent that the final effluent shall at all times contain a chlorine residual of not less than one half part per million after not less than 15 minutes contact time and a MPN of coliform organisms not greater than 100 per 100 ml. in at least 90% of the samples in a series thereof, provided that at no time may the MPN of such organisms in said final effluent exceed 10,000 per 100 ml.

(b) On or before August 1, 1967, submit final construction plans, in approvable form, prepared by or under the direction of a duly licensed professional engineer, for such facilities.

(c) On or before November 1, 1967, initiate construction of such facilities.

(d) On or before April 30, 1968, cause construction of such facilities to be completed.

(e) Thereafter maintain and operate said facilities in such manner that they shall at all times meet the performance criteria set forth in decretal provision 2(a) hereof and that the standards of no waters of the State shall be contravened by reason of the wastes aforesaid or their effluents.

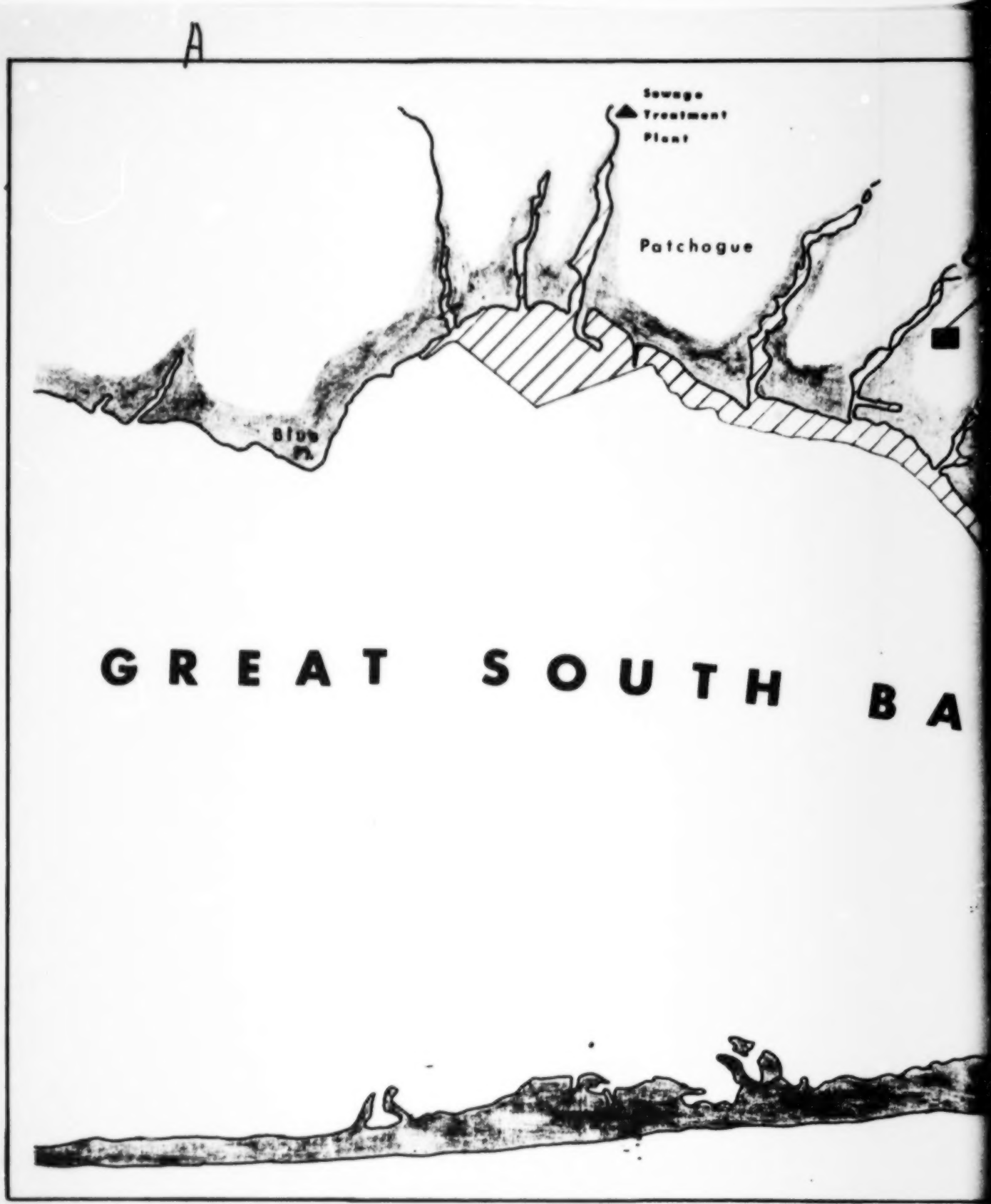
3. THAT any and all permits for the discharge of wastes or waste effluents into the waters of the State issued to the Respondent or to his predecessors or assignors by or on behalf of the New York State Department of Health or the Commissioner of Health of the State of New York or the Water Pollution Control Board be and they hereby are modified, effective May 1, 1968, or upon default of performance of any of the alternative decretal provisions hereof prior thereto, to refer and relate to and permit only the discharge of waste effluents treated in the facilities construction of which is hereby alternatively ordered.

DATED: Albany, New York
1966

HOLLIS S. INGRAHAM, M.D.
Commissioner of Health of the State
of New York

TO: WATER RESOURCES COMMISSION

GREENWALD, KOVNER & GOLDSMITH
(Attorneys for Respondent)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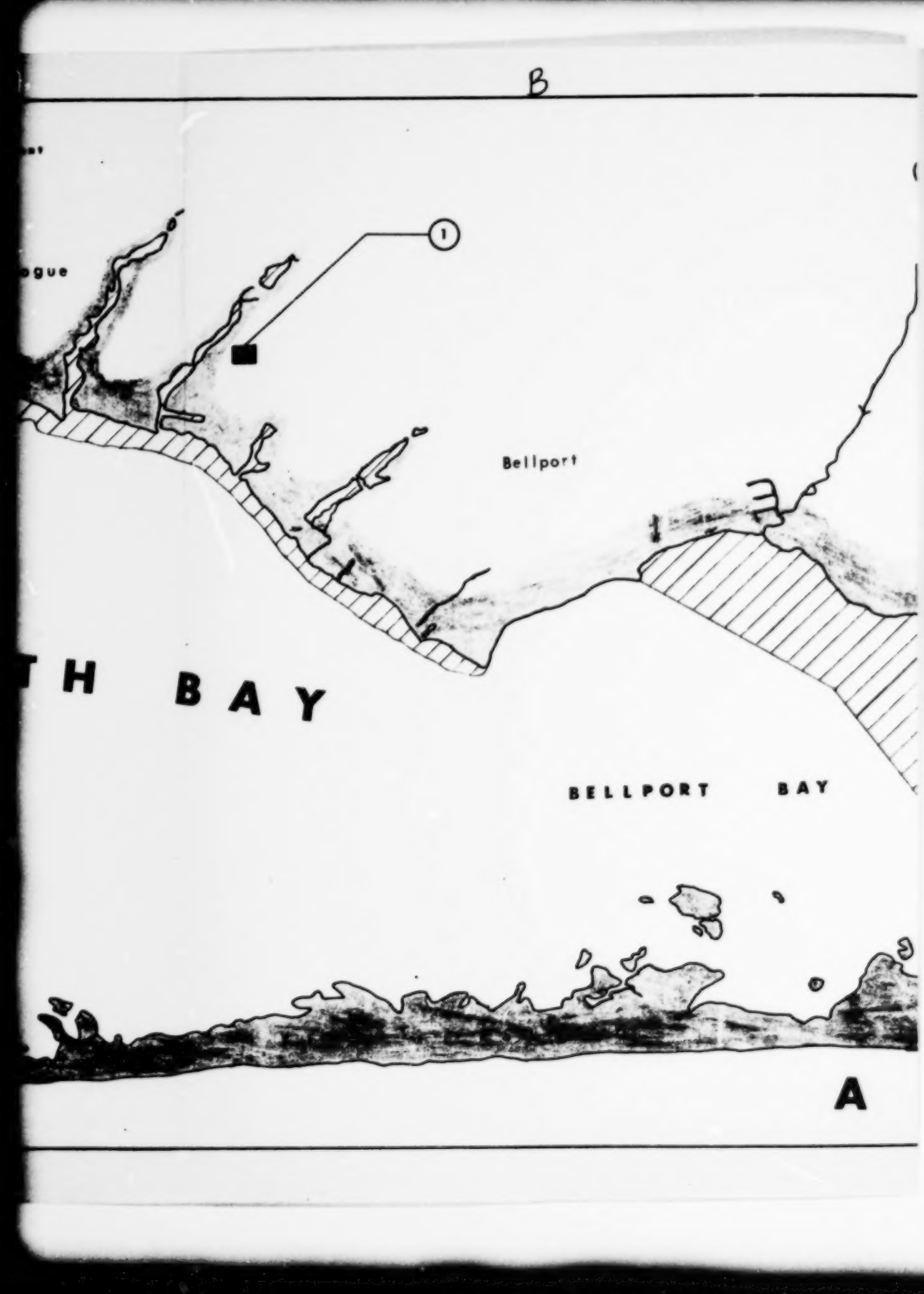
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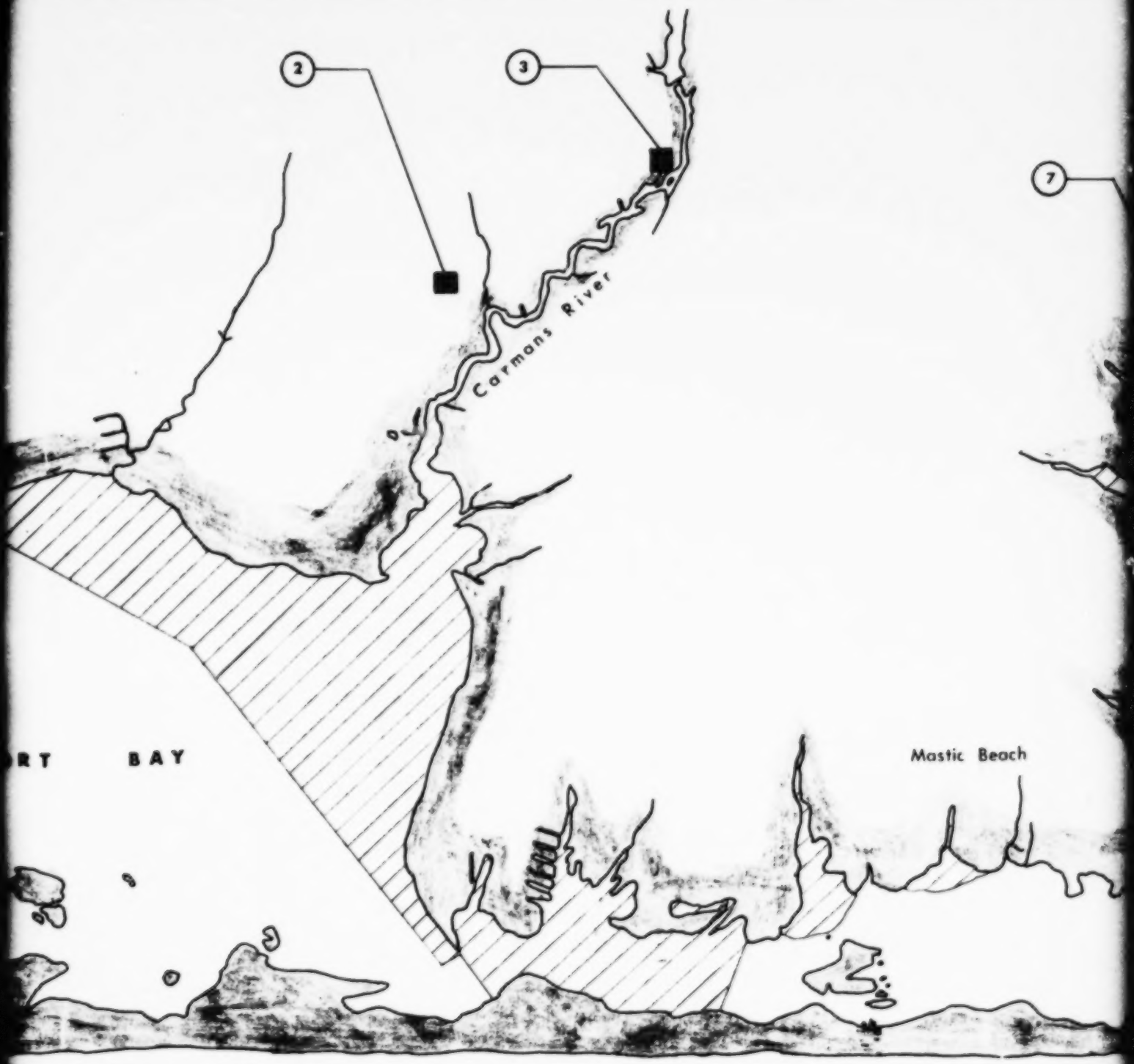

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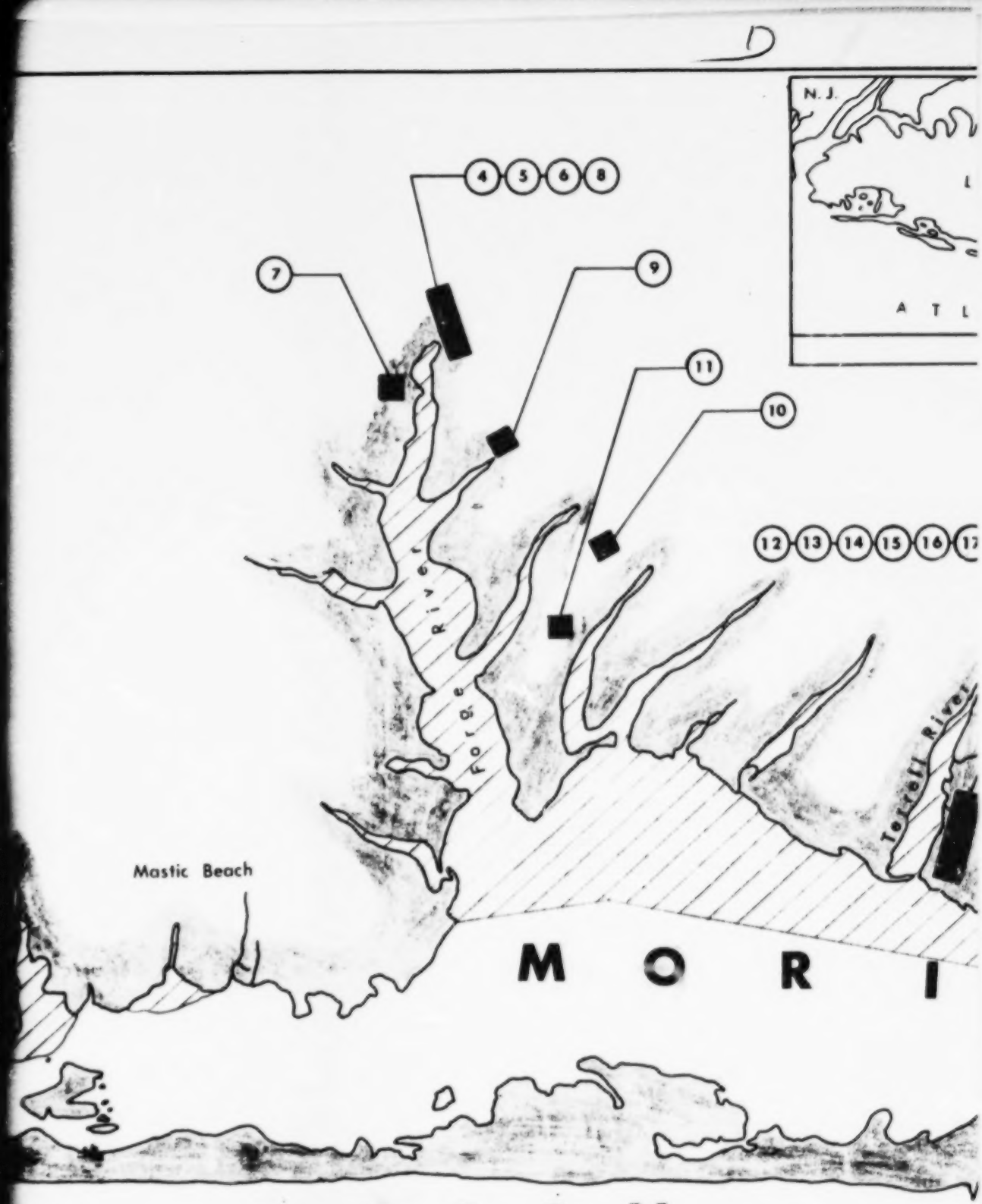
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Forge River
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Mastic Beach
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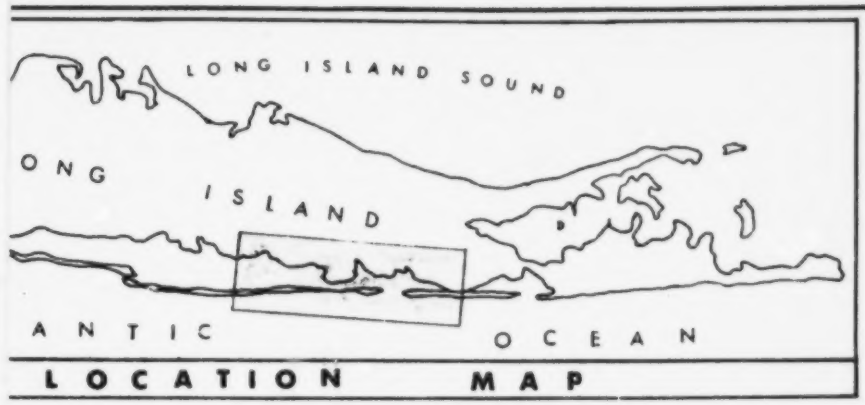
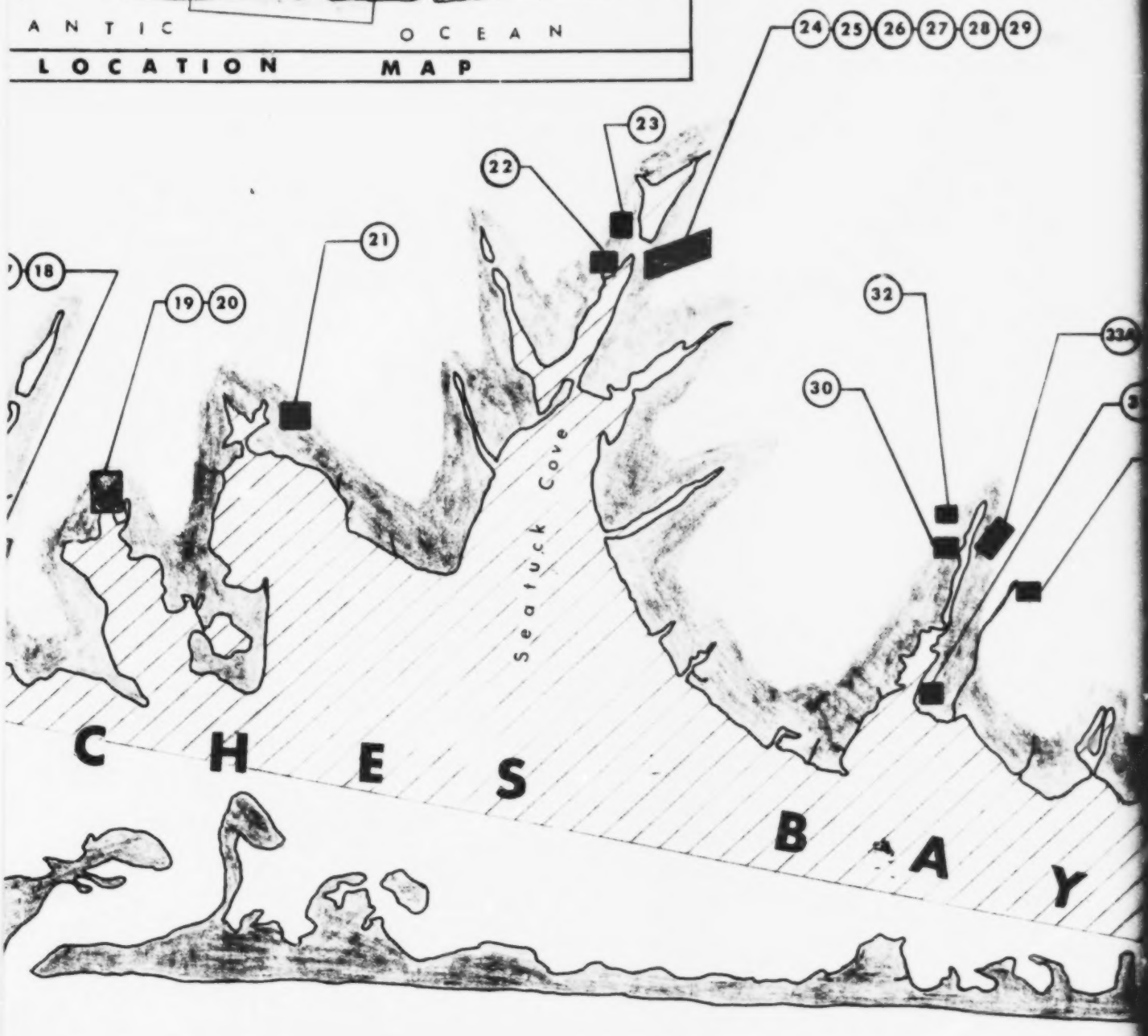


LOCATION MAP



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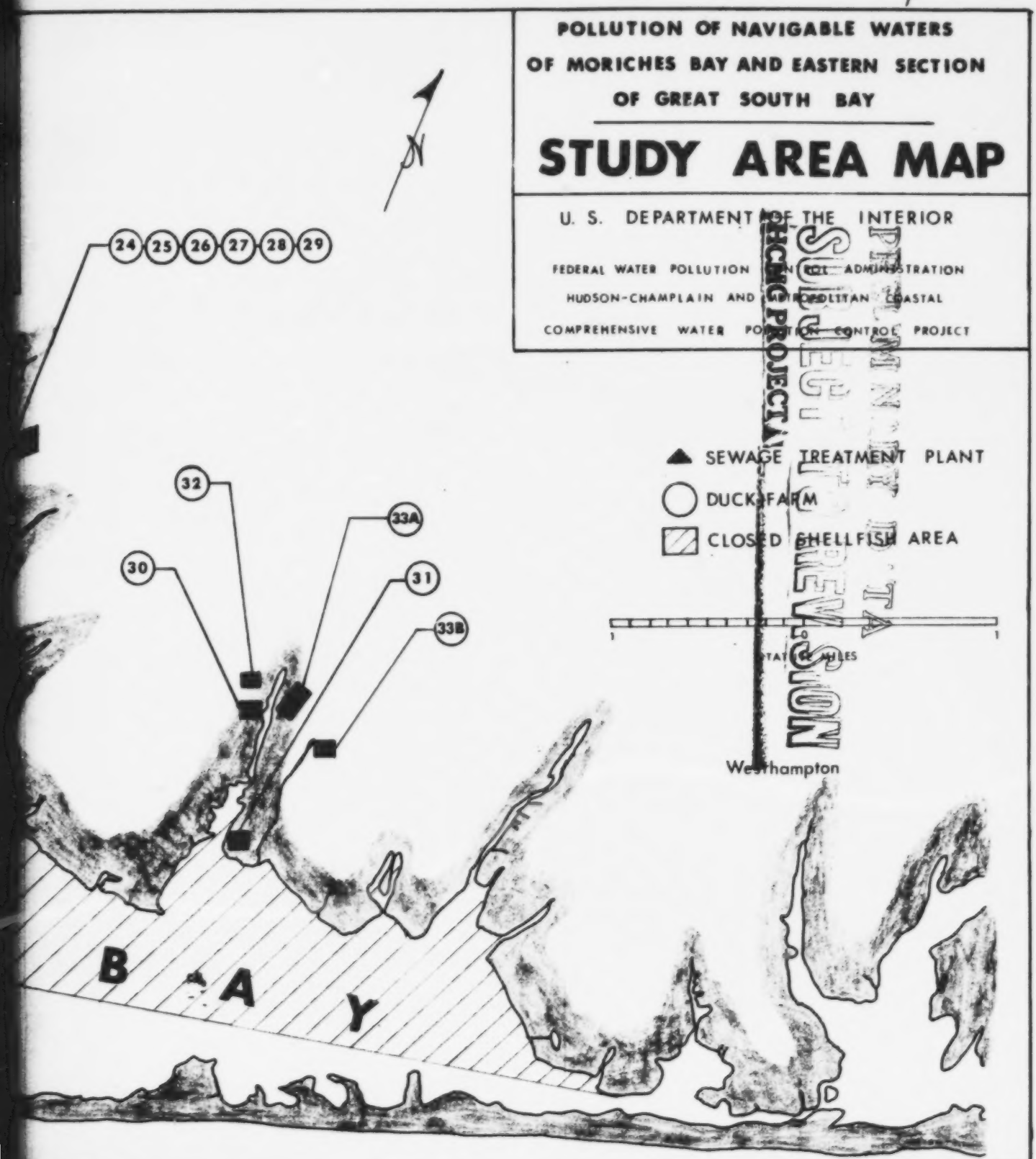
POLLUTION OF NAVIGABLE WATERS
OF MORICHES BAY AND EASTERN SECTION
OF GREAT SOUTH BAY
STUDY AREA MAP
U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
HUDSON-CHAMPLAIN AND METROPOLITAN COASTAL
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT
SEWAGE TREATMENT PLANT
DUCK FARM
CLOSED SHELLFISH AREA
24
25
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27
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31
32
33A
33B
B A Y
Westhampton

SUMMARY OF CONFERENCE
(First Session)

POLLUTION OF NAVIGABLE WATERS
OF
MORICHES BAY AND THE EASTERN SECTION OF GREAT SOUTH BAY
AND THEIR TRIBUTARIES
(LONG ISLAND, NEW YORK)

SEPTEMBER 20-21, 1966

The Secretary of the Interior, in accordance with section 10(d)(1) of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 466 et seq.), and his finding that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution, and the action of Federal, State, or local authorities, on August 18, 1966, called a conference in the matter of pollution of the navigable waters of Moriches Bay and the eastern section of Great South Bay and their tributaries. The conference was held September 20-21, 1966, at Felice's Restaurant, Patchogue, New York.

The area considered at the conference lies on the south shore of Long Island, New York. It consists of Moriches Bay west of Westhampton Beach, and the eastern end of Great South Bay, east of a line connecting Blue Point and Water Island. Included are Patchogue Bay, Bellport Bay, and Narrow Bay. Also included are the coves, rivers and estuaries tributary to the main bays.

Great South Bay and Moriches Bay are separated from the Atlantic Ocean by a narrow sand bar, in places only a few hundred yards wide. Both bays are extremely shallow, varying in depth from one to 11 feet, with a mean depth of four feet. Moriches Bay is nine miles long and varies from one to two miles in width. Great South Bay, in its entirety, is 24 miles long, averages three miles in width, and has an area of 95 square miles.

That portion of Great South Bay included in the conference area is eight miles long and two to four miles wide.

The following conferees representing the New York State Department of Health and the Federal Water Pollution Control Administration participated in the conference:

Dwight F. Metzler	Deputy Commissioner New York State Department of Health Albany, New York
Lester M. Klashman	Federal Water Pollution Control Administration Boston, Massachusetts
Murray Stein, Chairman	Federal Water Pollution Control Administration Washington, D. C.

Also participating in the conference were:

Mark Abelson	Northeast Regional Coordinator Department of the Interior Boston, Massachusetts
Maurice Barbash	Chairman, Citizens Committee for the Fire Island National Seashore Babylon, New York
George Biderman (by Lester M. Klashman)	Chairman, Fire Island National Seashore Advisory Commission New York, New York
Honorable William L. Burns	Assemblyman, State of New York Seventh Assembly District, Suffolk County, New York
James M. Catterson, Jr.	Chairman, Brookhaven Town Oceanography Committee Brookhaven, New York
William F. Cosulich	Consulting Engineer Syosset, New York
Paul DeFalco, Jr.	Federal Water Pollution Control Administration Metuchen, New Jersey

H. Lee Denison	County Executive Suffolk County, New York
Charles R. Dominy	Supervisor, Town of Brookhaven Brookhaven, New York
Edwin S. Furman	President, Southampton Town Baymen's Association, Inc. Hampton Bays, New York
E. E. Henkel	Suffolk County Sewer Agency Suffolk County, New York
Robert D. Hennigan	Director, Water Resource Services New York State Department of Health Albany, New York
Adrian Hoek	The Great South Bay Baymen's Association Suffolk County, New York
Nelson D. Houck	General Manager Long Island Duck Farmers Cooperative, Inc. Eastport, New York
Dr. Hollis S. Ingraham	Commissioner of Health New York State Department of Health Albany, New York
Honorable Robert F. Kennedy	United States Senate Washington, D. C.
Dr. George E. Leone	Commissioner, Suffolk County Department of Health Suffolk County, New York
Emanuel Licht	Feather Cooperative Marketing Association Brooklyn, New York
Hugh F. Mercer	General Manager, Bluepoint Company, Inc. West Sayville, New York
F. W. Montanari	Assistant Commissioner, State Conservation Department Division of Water Resources Albany, New York

Edward Morette	President, New York State Conservation Council Ticonderoga, New York
George Morrison	Regional Shellfish Consultant United States Public Health Service Department of Health, Education, and Welfare New York, New York
Frank L. Panuzio	Chief, Engineering Division New York District Corps of Engineers New York, New York
Honorable Otis G. Pike (by Murray Stein)	Congressman, First District, New York House of Representatives Washington, D. C.
Mrs. James R. Sherard	Vice President, League of Women Voters, Islip, New York Chairman, Water Resources Committee, Suffolk County Council
August Stout, Jr.	Chairman, Moriches Inlet Stabilization Committee Center Moriches, New York
Dr. George H. Vanderborgh, Sr.	Oyster Institute of North America and Long Island Shellfish Farmers, Inc. West Sayville, New York
Ralph VanDerwerker	Program Director, Environmental Engineering and Food Protection United States Public Health Service Department of Health, Education, and Welfare New York, New York
Robert Vojvoda	Supervisor, Town of Riverhead Riverhead, New York
David H. Wallace	Director, Bureau of Marine Fisheries New York State Conservation Department Oakdale, New York
Mrs. Elizabeth M. Wallace	Director, Oyster Institute of North America Sayville, New York

The Chairman of the conference pointed out that:

1. The Federal Water Pollution Control Act, as amended, (33 U.S.C. 466 et seq.) provides that pollution of interstate or navigable waters, whether the matter causing or contributing to the pollution is discharged directly into such waters, or reaches such waters after discharge into a tributary, which endangers the health or welfare of any persons, shall be subject to abatement.

2. Under the provisions of section 10 of the Act, the Secretary of the Interior is authorized to initiate enforcement procedures when he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution subject to abatement under the Act, and action of Federal, State, or local authorities.

3. The first step of these enforcement procedures is the calling of a conference.

4. The purpose of this conference is to bring together representatives of the State water pollution control agency and the Federal Water Pollution Control Administration, to review the existing situation and the progress which has been made, to lay a basis for future action by all parties concerned, and to give the State, localities and industries an opportunity to take any indicated remedial action under State and local law.

Conferees representing the New York State Department of Health and the Federal Water Pollution Control Administration were present throughout the conference.

The conferees unanimously agreed to the following conclusions and recommendations:

1. On the basis of statements presented at the conference, evaluation of the testimony, the answers, and the conclusions, the conferees believe the waters of Moriches Bay and the eastern section of Great South Bay are polluted.

2. This pollution substantially interferes with the shellfish industry in the shipment and marketing of shellfish in interstate commerce.

3. To date, the remedial measures taken to abate the pollution have not been adequate. The delays in abating the pollution are due to the very complicated nature of the problem and the tremendous growth of the community in terms of population.

4. The conferees believe that the pollution problems are amenable to solution, and that multiple uses of the waters are possible.

5. There are four points involved in the total pollution control problem in the conference area. These are: (1) duck farm wastes, (2) domestic wastes, (3) sludge deposits in the bay waters, and (4) the bay inlets.

6. The conferees agree it will be necessary to develop a comprehensive, detailed plan and program for remedial action, including time schedules, to effect a solution to the total water pollution problem in the conference area. For this purpose a coordinating committee consisting of Federal, State and local representatives will be established to analyze the four

points listed above, develop an integrated plan for pollution control, detailed recommendations for remedial action, and a time schedule to put these recommendations into effect. Within one month from the date of this conference, the coordinating committee is to make recommendations on the inlets problem. The committee is to prepare a comprehensive report on its program and plans for remedial action within six months from the date of this conference.

7. Upon completion of the report of the coordinating committee, the conference will be reconvened at the call of the chairman, to evaluate the report, and adopt a uniform plan and time schedule for pollution abatement.

8. The coordinating committee will consist of Mr. Robert Henningan, of the New York State Department of Health, who will be Committee Chairman; Mr. David Wallace, Director of Marine Fisheries in the New York State Conservation Department; a representative of the U. S. Public Health Service Shellfish Program; Mr. Mark Abelson, Northeast Regional Coordinator, for the Department of the Interior; a representative of the Duck Growers Association, a representative of the shellfish interests; Dr. George Leone, of the Suffolk County Department of Health, and a representative of the local government.

9. The Federal Water Pollution Control Administration will provide financial assistance and the necessary staff to the coordinating committee, and State and Federal technical resources will also be made available to the committee.

10. The conferees endorse the New York State orders to abate pollution in the conference area, both in the time schedule incorporated in the orders and the amount and degree of treatment required. Although these are primarily State orders to be enforced by the State, the conferees recommend that they be made Federal requirements, as well. These orders have not been displaced by this conference, and are in full force and effect. A typical order is attached (Appendix A).

APPENDIX A

EXAMPLE OF A TYPICAL ORDER

NEW YORK STATE DEPARTMENT OF HEALTH

EXAMPLE OF TYPICAL ORDER

STATE OF NEW YORK : DEPARTMENT OF HEALTH

IN THE MATTER of the Complaint against:

Poultry Farm,

Respondent,

by Reason of Alleged Violations of Article 12 of the Public Health Law.

STATE OF NEW YORK : DEPARTMENT OF HEALTH

IN THE MATTER of the Hearing to Receive Evidence Relevant to such Action, if any, as should be Taken in Regard to Modification or Revocation of Permits to Discharge Waste Effluents into

issued to:

Poultry Farm,

Respondent,

or the Predecessors or Assignors

ORDER

A public hearing in the above entitled proceedings having been returnable herein pursuant to due written notice served in the manner provided by law and the convening of said hearing having been waived by the parties and the New York State Department of Health having appeared generally therein by its Counsel, DONALD A. MacHARG, DERMOT C. REILLY of Counsel, and the Respondents having appeared generally therein by their Attorneys, GREENWALD, KOVNER & GOLDSMITH of New York City, and documentary exhibits having been received on behalf of said Department, and said Counsel for said Department and said Attorneys for Respondent having entered into a written Stipulation that facts exist upon which this Order might be made, served and filed, and said Hearing Officer having approved said Stipulation,

NOW, on reading and filing the notice of hearing and admission of service thereof and stipulation and due deliberation having been had, it is ORDERED:

1. THAT the Stipulation aforesaid be and the same hereby is approved and the facts therein are found and the conclusions therein are arrived at.

2. THAT all Orders of the Water Pollution Control Board of the State of New York directed to or against the Respondents or any of them be and they hereby are modified to provide that the Respondents shall, and each of said Respondents is hereby Ordered and directed, on and after January 2, 1967, to cease and abate, and thereafter keep abated, all discharges of duck wastes and duck processing wastes by him or it or through or from lands or facilities owned by him or it or under his or its management or control into the waters of the State unless said Respondent shall, either individually or in conjunction with others:

(a) On or before January 1, 1967, submit to the New York State Department of Health, through the Suffolk County Health Department, preliminary plans showing facilities for biological treatment of all such wastes and/or effluents thereof to the extent that at least 85% of the suspended solids and at least 85% of the biochemical oxygen demand and a substantial portion of the phosphates thereof and therein shall be removed and facilities for disinfecting such wastes and/or waste effluents to the extent that the final effluent shall at all times contain a chlorine residual of not less than one half part per million after not less than 15 minutes contact time and an MPN of coliform organisms not greater than 100 per 100 ml. in at least 90% of the samples in a series thereof, provided that at no time may the MPN of such organisms in said final effluent exceed 10,000 per 100 ml.

(b) On or before August 1, 1967, submit final construction plans in approvable form, prepared by or under the direction of a duly licensed professional engineer, for such facilities.

(c) On or before November 1, 1967, initiate construction of such facilities.

(d) On or before April 30, 1968, cause construction of such facilities in accordance with approved plans to be completed.

(e) Thereafter maintain and operate said facilities in such manner that they shall at all times meet the performance criteria set forth in decretal provision 2(a) hereof and that the standards of the waters of the State shall be contravened by reason of the wastes aforesaid or their effluents.

3. THAT any and all permits for the discharge of wastes or waste effluents into the waters of the State issued to the Respondents or to any of them or any of their predecessors or assignors by or on behalf of the New York State Department of Health or the Commissioner of Health of the State of New York or the Water Pollution Control Board be and they hereby are modified, effective May 1, 1968, or upon default of performance of any of the alternative decretal provisions hereof prior thereto, to refer and relate to and permit only the discharge of waste effluents treated in the facilities construction of which is hereby alternatively ordered, and as so modified, are continued.

DATED: Albany, New York
1966

HOLLIS S. INGRAHAM, M.D.
Commissioner of Health of
the State of New York

TO: WATER RESOURCES COMMISSION
GREENWALD, KOVNER & GOLDSMITH
Attorneys for Respondent